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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/259,145	02/26/99	PAN	P 3027.1US

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EXAMINER

MAI, A

ART UNIT

PAPER NUMBER

2814

8

DATE MAILED: 11/05/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/259,145

Applicant(s)

PAN ET AL

Examiner

Anh D. Mai

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 1999.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☒ The proposed drawing correction filed on 23 August 1999 is: a) ☒ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) _____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 14) ☐ Notice of References Cited (PTO-892)
- 15) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 16) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 17) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 18) ☐ Notice of Informal Patent Application (PTO-152)
- 19) ☐ Other: _____

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DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

1. Claims 25, 26 and 29-31 are rejected under 35 U.S.C. 102(e) as being anticipated by applicant's prior art.

Applicant's prior art discloses a pre-anneal intermediate structure in the formation of an isolation structure for a semiconductor device similar as claimed including:

a semiconductor substrate (202) having a first surface and a second surface;

at least one first doped area (204/206) on the substrate first surface;

a substantially dopant-free, uninterrupted diffusion barrier layer (212) over the at least one first doped area on the substrate first surface. (See Fig. 16, page 2).

With respect to claim 26, the structure of applicant's prior art also includes a oxide layer (210) between the substrate first surface and the diffusion barrier layer (212).

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With respect to claim 29, the first doped area (204) of applicant's prior art is a P-type impurity.

With respect to claim 30, the first doped area (206) of Itou is a N-type impurity.

With respect to claim 31, the diffusion barrier layer (212) of applicant's prior art is silicon nitride.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's prior art as applied to claim 25 above, and further in view of Mathews et al. (U.S. Patent No. 5,837,378).

Applicant's prior art discloses a device as discussed supra but fails to form the diffusion barrier layer (212) over the substrate second surface.

However, Mathews, in a similar device, discloses a substantially dopant-free, uninterrupted barrier layer (154b) formed over the second surface of substrate (150). (See Fig. 2A, col. 4, l. 63-col. 5, l. 10).

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It would have been obvious to one having ordinary skill in the art at the time of the invention to form the barrier layer (154b) over second surface of the substrate (202) of applicant's prior art as taught by Mathews because the formation of the barrier layer on the second surface reduces overall stress on the wafer thus prevent warpage.

3. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's prior art as applied to claim 8 above, and further in view of Shim et al. (U.S. Patent No. 5,846,596).

Applicant's prior art discloses a pre-anneal intermediate structure as described supra but fails to include silicon oxynitride.

However, Shim, in a similar structure, discloses forming oxidation resistant layer (130) using silicon oxynitride (130). (See col. 3, ll.18-20).

It would have been obvious to one having ordinary skill in the art at the time of the invention to form the substantially dopant-free, uninterrupted diffusion barrier layer (212) of applicant's prior art using silicon oxynitride (130) as taught by Shim because it has an added advantage of oxidation resistance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is 703-305-0575. The examiner can normally be reached on 8:30AM-5:00PM.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

A.M.

Anh D. Mai
November 2, 1999


Olik Chaudhuri
Supervisor
Technology Center 1200